

REMARKS

By this amendment, Claims 1, 38, 75, 76, 77, and 78 have been amended, and no claims have been canceled or added. Accordingly, Claims 1-78 are presently pending and favorable consideration thereof is respectfully requested.

Generally, the independent claims have been amended to specify that a pulse of charging current is applied to the most discharged battery, the pulse having a period less than the time required to bring the most discharged battery up to the same charge as a next most discharged battery in the system. Support for this amendment can be found from the specification in general and in particular p. 19, line 28, for example.

Applicant wishes to thank the Examiner for the courtesies extended at the interview on June 30, 2006. Generally, at that interview, applicant explained that Cummings et al. discloses continuous charging of the most discharged battery until the charge on that battery is the same as the charge on the next most discharged battery, at which time both batteries are charged simultaneously. This can increase the current draw on the battery charger, and thus require the battery charger to have high power circuits to supply the possible currents that may be demanded to effect charging. Applicant pointed the Examiner to page 2 of applicant's specification in which the undesirability of this method of charging was explained. Applicant pointed out that applicant's claims contemplate the production of a pulse of current being supplied to the most discharged battery, the pulse being of relatively short duration and less than the time required to charge the most discharged battery up to the charge level of the next most discharged battery. Applicant directed the Examiner to the specification at page 12, line 30 to page 13, line 11; page 17, line 10 to page 18 line 21; page 19, lines 2-9 and line 28; and page 24, line 25 to page 25, line 4; to quickly gain an appreciation for features of the claimed invention. After discussion, it was agreed that the amended language of Claim 1, for example, which reads

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"applying a pulse of charge current . . ." would distinguish over Cummings et al. The Examiner indicated, however, that he may wish to go back and review the prior art again.

Claim Rejections 35 U.S.C. § 102

The Examiner has rejected Claims 1-6, 15-19, 24-30, 38-43, 53-56, 61-67, and 75-78 under 35 U.S.C. § 102(b) as being anticipated by Cummings et al. (U.S. Patent No. 6,194,867).

Cummings et al. fails to disclose:

applying a pulse of charging current to said most discharged battery for a at least part of a first period of time less than a period of time required to charge said most discharged battery up to the same charge as a next most discharged battery in said system before identifying a succeeding most discharged battery in said system

as recited in applicant's Claim 1.

Cummings et al. discloses supplying a continuous charge current to the most discharged battery until it reaches the charge of another battery or a subset of batteries. The lower charged batteries are then simultaneously charged, and the process is repeated until all batteries hold the same charge, at which time the simultaneous charge is resumed by closing all switches to the batteries (Col. 4, lines 53-57). This can have the effect of demanding a significant current from the charger, which is a problem addressed by applicant's invention, as stated in applicant's specification at p. 2, lines 4-6 and lines 20-23.

Applicant's claim language implies a sequence or succession of: identifying a most discharged battery, applying a pulse of charging current to the most discharged battery for at least part of a first period of time, and then identifying a succeeding most discharged battery in the system. In other words, after a most discharged battery is charged for a first period of time, the state of charge signals are again checked to determine which battery in the system is now the most discharged battery. Charging current is then applied to only the most discharged battery before the state of charge signals are again checked to determine whether or not there is a new

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most discharged battery (see applicant's FIGURE 9). Consequently, in applicant's system, only one battery is charged at a time.

The sequence of checking for the most discharged battery and then applying a pulse of charging current to it for a period of time before identifying a succeeding most discharged battery, means that the batteries are not charged continuously, but rather are charged a little at a time. More particularly, the most discharged battery is charged with a pulse of charging current for a period of time, then charging stops, then the state of charge signals are used to identify the most discharged battery, then that most discharged battery is given a pulse of charging current. Since there is a successive identification of the most discharged battery, the charging period of the pulse is not dependent upon the relative state of charge of the batteries in the system, but rather on the time between successively identifying.

As recited in later claims, the period of time during which the most discharged battery is charged may be dependent on a number of factors including battery types and loads, for example, (see spec) and is not dependent upon the state of charge of any other battery in the system. In applicant's claimed system, the states of charge are determined in succession with charging in between, and the period of time for charging is not dependent on the relative states of charge of batteries in the system.

Cummings et al. describes a system in which the decision of whether or not a battery receives charging current is dependent upon the relative state of charge of the battery, and the period during which the battery is charged is also dependent upon the relative state of charge of the battery.

In applicant's system, the relative state of charge determines whether or not a battery will receive a charging current but the period of time during which charging current is supplied is

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independent of the relative state of charge and is only dependent upon properties of the battery being charged and the load it faces.

Thus, applicant's method produces a substantially different charging sequence than the apparatus disclosed by Cummings et al. for the reason that Cummings et al. fails to disclose "successively identifying, from the state of charge signals, a most discharged battery in the system, or applying a pulse of charging current," as recited in applicant's Claim 1. By providing a continuous charging current, Cummings et al. permits batteries to be simultaneously charged. In contrast, applicant's system always identifies a most discharged battery, and delivers only a pulse of charging current to that battery. Consequently, only one battery receives charging current at any given time. The load on the battery charger is always only the load of one battery circuit at a time, and never more than one battery circuit at a time. The applicant's system also does not require the batteries to supply the same load and, in fact, the batteries can be connected to different loads because only one battery is charged at a time due to the successive nature of identifying the most discharged battery and charging it before identifying the most discharged battery at a next succeeding time. Not only can the batteries be connected to different loads, they can be supplying current to those loads at the same time they are being charged.

In view of the above, applicant respectfully submits that Cummings et al. fails to disclose every element of applicant's amended Claim 1, and therefore, the cited reference fails to satisfy the test for anticipation. Applicant, therefore, submits that amended Claim 1 is not anticipated.

Claims 2-37 are all ultimately dependent on amended Claim 1 and should be allowable due to their dependency and due to the additional subject matter these claims recite.

Claim 38 recites language similar to that of Claim 1, and therefore, for the same reasons set forth in connection with applicant's amended Claim 1, Cummings et al. fails to disclose every element of the applicant's amended Claim 38, and therefore, the cited reference fails to satisfy

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the test for anticipation. Consequently, applicant submits that amended Claim 38 is not anticipated.

Claims 39-74 are all ultimately dependent on Claim 38 and should be allowable due to their dependency and due to the additional subject matter these claims recite.

Applicant's amended Claim 75 recites language similar to that of Claim 1. Claim 75 is an apparatus claim, including elements in means plus function format generally corresponding to elements in applicant's amended Claim 1. For the same reasons set forth in connection with applicant's amended Claim 1, Cummings et al. fails to disclose every element of the applicant's amended Claim 75, and therefore, the cited reference fails to satisfy the test for anticipation. Consequently applicant submits that amended Claim 75 is not anticipated.

Applicant's Claim 76 recites language similar to that of amended Claim 1. For the same reasons set forth in connection with applicant's amended Claim 1, Cummings et al. fails to disclose every element of the applicant's amended Claim 76, and therefore, the cited reference fails to satisfy the test for anticipation. Consequently, applicant submits that Claim 76 is not anticipated.

Amended Claim 77 is a computer readable medium claim that includes elements that generally correspond to elements in Claim 76. For the same reasons set forth in connection with applicant's amended Claim 1 and amended Claim 76, Cummings et al. fails to disclose every element of the applicant's amended Claim 77, and therefore, the cited reference fails to satisfy the test for anticipation.

Applicant's amended Claim 78 recites language similar to that of amended Claim 1 in that it recites applying pulses of charging current to individual batteries or battery banks. Cummings et al. fails to disclose every element of applicant's Claim 78, and therefore, the cited

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reference fails to satisfy the test for anticipation. Applicant, therefore, submits that Claim 78 is not anticipated, and the Examiner's rejection is improper and should be withdrawn.

Claim Rejections 35 U.S.C. § 103

The Examiner has rejected Claims 7-14, 20-23, 31-37, 44-52, 57-60, and 68-74 as being obvious in view of Cummings et al.

Above, it has been shown that Cummings et al. fails to anticipate any of applicant's amended independent claims. For the same reasons presented in connection with anticipation above, Cummings et al. fails to provide any suggestion or motivation to provide a pulse of charging current rather than a continuous charging current and thus fails to present a solution that addresses the same problem, i.e., reduction of current in a multiple battery charger. There is nothing to lead a skilled technician to applicant's claimed invention. Therefore, applicant's amended claims and the claims dependent thereon are not obvious.

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Date: July 5, 2006 James W. Chable

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